

DETAILED ACTION

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Walter Hackler on December 13, 2010.

The application has been amended as follows:

Claim 1 (Currently Amended): A method for manufacturing ceramic hollow fibers from nanoscale powders, the method comprising:

manufacturing a ceramic mass by transforming a nanoscale metal oxide, carbide, nitride or sulfide powder with an oxycarboxylic acid, compounded to the ceramic mass with at least one solvent and an acrylate and/or methacrylate as a polymeric binder, the metal oxide, carbide, nitride, or sulfide powder having a particle size of between 1 and 50 nm and the ceramic mass having a solid content of ~~at least~~ greater than 30 vol%;

adding to the ceramic mass a carbon based, organic or inorganic component as a sacrificial material in amount between 5 and 20 wt%;

extruding or spinning the ceramic mass to hollow fiber blanks;

polymerizing the acrylate and/or methacrylate binder by using a radial starter;

and

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sintering the blanks to form fibers having an external diameter $<200\text{ }\mu\text{m}$ and a pore size of between 0.5 and ~~20~~ 100 nm.

Claim 19 (Currently Amended): A method for manufacturing ceramic hollow fibers from nanoscale powders, the method comprising:

manufacturing a ceramic mass by transforming a nanoscale metal oxide, carbide, nitride or sulfide powder with an oxycarboxylic acid, compounded to the ceramic mass with at least one solvent and an acrylate and/or methacrylate as a polymeric binder, the metal oxide, carbide, nitride, or sulfide powder having a particle size of between 1 and 50 nm and the ceramic mass having a solid content of ~~at least~~ greater than 30 vol%;

adding to the ceramic mass a carbon based, organic or inorganic component as a sacrificial material in amount between 5 and 20 wt%;

extruding or spinning the ceramic mass to hollow fiber blanks;

polymerizing the acrylate and/or methacrylate binder by using a radial starter;

and

sintering the blanks to form fibers having an external diameter $<100\text{ }\mu\text{m}$ and a pore size of between 0.5 and ~~5~~ 100 nm.

REASONS FOR ALLOWANCE

2. The following is an examiner's statement of reasons for allowance: the prior art made of record does not anticipate nor suggest all the limitations in the present claims.

3. Soria et al (FR 2776287 where US Patent 6,573,208 is used as an English translation) teaches a method of manufacturing a porous ceramic material that is a hollow fiber (column 3 lines 9 – 11) that is similar to the method described by the applicant. Soria fails to explicitly disclose using an oxycarboxylic acid, the particle size of the ceramic powder is between 1 and 50 nm, the ceramic mass having a solid content greater than 30 vol%, adding to the ceramic mass a carbon based organic or inorganic component as a sacrificial material in an amount between 5 and 20 wt%, polymerizing the acrylate and/or methacrylate binder using a radial starter and sintering the blanks to form fibers having an external diameter of < 200 microns and a pore size of between 0.5 and 100 nm.

4. Kolb et al (WO 01/30702) teaches a process of making zirconia sol (Abstract) where zirconium salt is mixed with 2-[2-(2-methoxyethoxy)ethoxy] acetic acid (page 2 lines 27 – 30, page 3 lines 21 – 22), where 2-[2-(2-methoxyethoxy)ethoxy] acetic acid is a synonym for 3,6,9-trioxadecanoic acid. Kolb fails to explicitly disclose the method disclose in the pending claims.

5. Terpstra et al (US Patent 5,707,584) teaches a method similar to the method described by Soria and applicant and in addition that the solid content of the ceramic mass be between 30% and 70% by volume (column 3 lines 14 – 16) and that is well known to produce hollow fibers with an outer diameter between 50 and 6000 microns (column 2 lines 56 – 58). Terpstra fails to explicitly disclose using an oxycarboxylic acid, the particle size of the ceramic powder is between 1 and 50 nm, adding to the ceramic mass a carbon based organic or inorganic component as a sacrificial material in an

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amount between 5 and 20 wt%, polymerizing the acrylate and/or methacrylate binder using a radial starter and sintering the blanks to form fibers having a pore size of between 0.5 and 100 nm.

6. Tange et al (US Patent 5,082,607) teaches a method of producing porous ceramics (Abstract) and uses a monofunctional unsaturated compound like methacrylate or acrylic acid (column 3 lines 8 – 29) and a radical polymerization initiator (column 4 lines 54 – 59). Tange fails to explicitly disclose a method as described by Soria and the pending claims in addition to using an oxycarboxylic acid, the particle size of the ceramic powder is between 1 and 50 nm, the ceramic mass having a solid content greater than 30 vol%, adding to the ceramic mass a carbon based organic or inorganic component as a sacrificial material in an amount between 5 and 20 wt% and sintering the blanks to form fibers having an external diameter of < 200 microns and a pore size of between 0.5 and 100 nm.

7. Renlund et al (US Patent 4,571,414) teaches an embodiment of a method of manufacturing ceramic hollow tube where, after sintering, the tubes had a density greater than 95% of the theoretical density (column 13 lines 57 – 67). Renlund fails to explicitly disclose the method described in Soria and the pending claims.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOSHEL RIVERA whose telephone number is (571) 270-7655. The examiner can normally be reached on Monday - Thursday 7:30am - 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Katarzyna Wyrozebski can be reached on (571) 272-1127. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. R./
Examiner, Art Unit 1746

/KAT WYROZEBSKI/
Supervisory Patent Examiner, Art Unit 1746